

CHAPTER 7

FIRERESISTANT MATERIALS AND CONSTRUCTION

780 CMR 701.0 GENERAL

701.1 Scope: The provisions of 780 CMR 7 shall govern the design and installation of all materials and methods of construction in respect to required fireresistance rating and flameresistance, as determined by the potential fire hazard of the use and occupancy of the building or structure and the location and function of all integral structural and other fireresistive elements of the building; and the installation of safeguards against the spread of fire to and from adjoining structures.

701.2 Performance standards: The requirements of 780 CMR 7 shall constitute the minimum functional performance standards for fire protection purposes; and shall not be deemed to decrease or waive any strength provisions or in any other manner decrease the requirements of 780 CMR in respect to structural safety.

701.3 Combustible materials: All materials and forms of construction which develop the fireresistance ratings required by 780 CMR shall be acceptable for fireproofing and structural purposes, except that combustible component materials in structural units or structural assemblies shall be limited in the types of construction specified in 780 CMR 603.0, 604.0 and 605.0, and in 780 CMR 701.3.1.

701.3.1 Combustible components: Combustible aggregates are permitted in gypsum concrete mixtures approved for fireresistance rated construction. Any approved component material or admixture is permitted in assemblies that meet the fireresistive test requirements of 780 CMR.

780 CMR 702.0 DEFINITIONS

702.1 General: The following words and terms shall, for the purposes of 780 CMR 7 and as used

elsewhere in 780 CMR, have the meanings shown herein.

Damper, fire: A damper arranged to seal off air flow automatically through part of an air duct system, so as to restrict the passage of heat. The fire damper shall not be used as a smoke damper unless the location lends itself to the dual purpose (see 780 CMR 717.0).

Door assembly, fire: A combination of the *fire door*, frame, hardware and other accessories which together provide a specific degree of fire protection to the opening (see 780 CMR 716.0).

Door, fire: A door and its assembly, so constructed and assembled in place as to give protection against the passage of fire (see 780 CMR 716.0).

Draftstopping: Building materials installed to prevent the movement of air, smoke, gases and flame to other areas of the building through large concealed passages such as *attic* spaces and floor assemblies with suspended ceilings or openweb trusses (see 780 CMR 720.0).

Fire area: The aggregate floor area enclosed and bounded by *fire walls*, exterior walls or *fire separation assemblies* of a building (see 780 CMR 709.2).

Fire partition: A vertical assembly of materials having protected openings and designed to restrict the spread of fire (see 780 CMR 711.0).

Fire protection rating: The time in hours, or fractions thereof, that an opening protective assembly will resist fire exposure as determined by the test standard specified in 780 CMR (see 780 CMR 706.0, 716.0 and 718.0).

Fire separation assembly: A horizontal or vertical fireresistance rated assembly of materials having

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protected openings, and designed to restrict the spread of fire (see 780 CMR 709.0).

Fire separation distance: The distance in feet measured from the building face to the closest *interior lot line*, to the center-line of a street or *public way* or to an imaginary line between two buildings on the same property.

Fire window: A window constructed and glazed to give protection against the passage of fire (see 780 CMR 718.0).

Firestopping: Building materials installed to prevent the movement of flame and gases to other areas of a building through small concealed passages in building components such as floors walls and stairs (see 780 CMR 720.0).

Protected construction: That in which all structural members are constructed, chemically treated, covered or protected so that the individual unit or the combined assemblage of all such units has the required fireresistance rating specified for its particular application in Table 602; and includes protected combustible and protected noncombustible construction.

Self-closing: As applied to a *fire door* or other opening protective, means normally closed and equipped with an approved device which will insure closing after having been opened for use (see 780 CMR 716.5).

Shaft: An enclosed space extending through one or more stories of a building, connecting vertical openings in successive floors, or floors and the roof (see 780 CMR 710.0).

Single membrane penetration: An opening through a single membrane (one side) of a fireresistance rated wall, roof/ceiling or floor/ceiling assembly made to accommodate pipes, tubes, conduits, vents, wires, cables, electrical outlet boxes and similar items (see 780 CMR 709.6.5).

Fireresistance: That property of materials or their assemblies which prevents or retards the passage of excessive heat, hot gases or flames under conditions of use.

Fireresistance rating: The time in hours or fractions thereof that materials or their assemblies will resist fire exposure as determined by the fire test specified in 780 CMR (see 780 CMR 704.1.1).

Smoke barrier: A continuous membrane that will resist the movement of smoke (see 780 CMR 712.0).

Smoke compartment: A space within a building enclosed by smoke barriers or *fire separation assemblies* on all sides, including top and bottom (see 780 CMR 712.0).

Through-penetration protection system: Specific building materials or assemblies of materials that are designed and installed to prevent the spread of fire through openings that are made in fireresistance rated floors and walls to accommodate through-penetrating items such as pipes, tubes, conduits, vents, wires, cables and similar items. The F rating indicates the period of time that the through-penetration protection system is capable of preventing the passage of flame to the unexposed (nonfire) side of the assembly in conjunction with an acceptable hose stream test performance. The T rating indicates the period of time that the through-penetration protection system is capable of preventing the passage of flame and a maximum individual temperature rise of 325°F (163°C) above ambient temperature on the unexposed (nonfire) side of the assembly in conjunction with acceptable hose stream test performance (see 780 CMR 707.7.2, 709.6.1 and 713.4.1).

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Vertical opening: An opening through a floor or roof.

Wall

Fire separation wall: A fireresistance rated assembly of materials having protected openings which is designed to restrict the spread of fire (see 780 CMR 709.0).

Fire wall: A fireresistance rated wall having protected openings, which restricts the spread of fire and extends continuously from the foundation to or through the roof (see 780 CMR 707.0).

Party wall: A fire wall on an interior lot line used or adapted for joint service between two buildings (see 780 CMR 707.0).

780 CMR 703.0 CONSTRUCTION DOCUMENTS

703.1 General: *Construction documents* for all buildings shall designate the type of construction and the fireresistance rating of all structure elements as required by 780 CMR. The *construction documents* shall include documentation or supporting data substantiating all required fireresistance ratings.

703.2 Penetrations: *Construction documents* for buildings more than two stories in height shall indicate where penetrations will be made for

Exception: In determining the fireresistance rating of exterior loadbearing walls, compliance with the ASTM E119 criteria for unexposed surface temperature rise and ignition of cotton waste due to passage of flame or hot gases, is required only for a period of time corresponding to the required fireresistance rating of an exterior nonloadbearing wall with the same *fire separation distance*, and in a building of the same use group. Where the fireresistance rating determined in accordance with this exception exceeds the fireresistance rating determined in accordance with ASTM E119

electrical, mechanical, plumbing and communication conduits, pipes and systems, and shall also indicate the materials and methods for maintaining the required structural integrity, fireresistance rating and *firestopping*.

780 CMR 704.0 FIRE TESTS

704.1 General: Building elements and assemblies including loadbearing and nonloadbearing walls and partitions, columns, girders, beams, slabs and floors and roof assemblies, shall provide the minimum fireresistance ratings specified in Table 602 for the type of construction unless otherwise required by the provisions of 780 CMR.

704.1.1 Fireresistance ratings: The fireresistance ratings of building assemblies and structural elements shall be determined in accordance with the test procedures set forth in ASTM E119 listed in *Appendix A*, specific methods as provided for herein, or shall be determined in accordance with an approved analytical method. Where an approved analytical method is utilized to establish the fireresistance rating of a structural element or building assembly, the calculations shall be based upon the fire exposure and acceptance criteria specified in ASTM E 119 listed in *Appendix A*.

listed in *Appendix A*, the fire exposure time period, water pressure and application duration criteria for the hose stream test of ASTM E119 listed in *Appendix A*, shall be based upon the fireresistance rating determined in accordance with this exception.

704.2 Alternative protection: Where documentation is submitted to the code official and approved, fireresistive coverings or insulating enclosing materials are not required for structural framing elements. Such documentation shall show that the structural integrity of structural framing elements will not be reduced below a safe level by a fire within the

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building or in an adjacent building having a severity corresponding to the fireresistance rating required for the elements through the installation of heat shields, separations or other approved means of *protection*.

704.3 Opening protectives: Opening protectives shall include the *fire door*, fire shutter, *fire window* or *fire damper* and all required hardware, anchorage, frames and sills necessary for the assembly.

704.4 Combustibility tests: Where the behavior of materials under exposure to fire is specified in 780 CMR, the characteristics of materials shall be determined by the tests and criteria set forth in 780 CMR 704.4.1, 704.4.1.1 and 704.4.1.2.

704.4.1 Tests: The tests indicated in 780 CMR 704.4.1.1 and 704.4.1.2 shall serve as criteria for acceptance of building materials as set forth in 780 CMR 603.0, 604.0 and 605 governing the combustibility of building materials in Types 1, 2, 3 and 4 construction. The term “noncombustible” does not apply to the flame spread characteristics of interior finish or trim materials. A material shall not be classified as a noncombustible building construction material which is subject to an increase in the combustible or flame spread rating beyond the limitations herein established through the effects of age, moisture or other atmospheric conditions.

704.4.1.1 Elementary materials: Materials which are intended to be classified as noncombustible shall be tested in accordance with ASTM E136 listed in *Appendix A*. Such materials shall be acceptable as noncombustible materials when at least three of four specimens tested conform to all of the following criteria:

1. The recorded temperature of the surface and interior thermocouples shall not at any time during the test rise more than 54°F (30°C) above the furnace temperature at the beginning of the test.

2. There shall not be flaming from the specimen after the first 30 seconds.

3. If the weight loss of the specimen during testing exceeds 50%, the recorded temperature of the surface and interior thermocouples shall not at any time during the test rise above the furnace air temperature at the beginning of the test, and there shall not be flaming of the specimen.

704.4.1.2 Composite materials: Materials having a structural base of noncombustible material as defined in 780 CMR 704.4.1.1, with a surfacing not more than 1/8 inch thick which has a flame spread rating not greater than 50 when tested in accordance with ASTM E84 listed in, *Appendix A* shall be acceptable as noncombustible materials.

780 CMR 705.0 EXTERIOR WALLS

705.1 General: All exterior walls shall comply with the applicable provisions of 780 CMR and with the fireresistance rating requirements of 780 CMR 705.0 and 780 CMR 602.0.

Exception: The provisions of 780 CMR 705.2 and 705.3 shall not apply to exterior walls which face buildings on the same *lot* where the buildings are such that, if combined into one structure, the resulting building will otherwise comply with the *height* and *area* limitations of 780 CMR 503.0 (see 780 CMR 503.1.3).

705.1.1 Omission of exterior walls: The provisions of 780 CMR shall not be deemed to prohibit the omission of exterior walls for all or part of a story where the provisions of 780 CMR 705.2 do not require a nonloadbearing exterior wall to provide a fireresistance rating, and where the provisions of 780 CMR 705.3 and 705.4 do not limit the maximum percentage of unprotected openings. Except as otherwise specifically permitted in 780 CMR 715.5, the piers, columns

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and other structural elements within the open portion shall be constructed with the

705.1.2 Combustible exterior wall finish and trim: In addition to the requirements of 780 CMR 705.0, combustible materials installed as *exterior wall finish*, half-timbering, balconies and similar appendages, bay and *oriel windows* and light-transmitting *plastic* panels, shall meet the applicable requirements of 780 CMR 1406.0, 2604.0, 2605.0 and 2606.0.

705.2 Fireresistance ratings: The fireresistance rating of exterior walls shall comply with Table 705.2. Loadbearing exterior walls shall also comply with the fireresistance rating requirements of 780 CMR 602.0. The fireresistance rating of exterior walls with a *fire separation distance* of greater than five feet (1524 mm) shall be rated for exposure to fire from the inside. The fireresistance rating of exterior walls with a *fire separation distance* of five feet (1524 mm) or less shall be rated for exposure to fire from both sides.

Table 705.2
EXTERIOR WALL FIRERESISTANCE
RATINGS^b

| Fire Separation distance (feet) ^c | Use Group ^a | | | | |
|--|------------------------|------------------|-----|-----|--------------------------------|
| | H-2 | F-1, H-3, M, S-1 | R-2 | R-3 | A, B, E, F-2, H-4, I, R-1, S-2 |
| 0 to 5 | 4 | 3 | 1 | 1 | 2 |
| Greater than 5 to 10 | 3 | 2 | 1 | 0 | 1 |
| Greater than 10 to 15 | 2 | 1 | 0 | 0 | 0 |
| Greater than 15 to 30 | 1 | 0 | 0 | 0 | 0 |
| Greater than 30 | 0 | 0 | 0 | 0 | 0 |

Note a. For requirements for Use Group H-1, see 780 CMR 705.2.1.

Note b. Fireresistance ratings are expressed in hours.

Note c. 1 foot - 304.8 mm.

fireresistance rating required for exterior loadbearing walls in Table 602.

705.2.1 Use Group H-1: Buildings and structures with an occupancy in Use Group H-1 shall be located in accordance with the requirements for the storage of *explosives* in the fire prevention code listed in **Appendix A**. The allowable quantities of Use Group H-1 materials shall be based on the TNT equivalency of the materials. The *exterior finish* surface of all exterior walls in an occupancy in Use Group H-1 shall be of approved noncombustible materials or fireretardant-treated wood complying with 780 CMR 2310.0 for exterior installation.

705.2.2 Wall support: The wall shall extend to the height required by 780 CMR 705.6, and shall be supported such that the wall will remain in place for the duration of time indicated by the required fireresistance rating.

705.2.3 Automatic fire suppression: In buildings equipped throughout with an *automatic sprinkler system* in accordance with 780 CMR 906.2.1, the required fireresistance rating of nonloadbearing exterior walls shall be reduced by one hour, except that where the *fire separation distance* is five feet (1524 mm) or less, the fireresistance rating shall not be reduced to less than one hour. This reduction shall not apply to occupancies in Use Group H.

705.2.4 Unexposed surface temperature: Where protected openings are not limited by Table 705.3, the limitation on the rise of temperature on the unexposed surface of exterior walls as required by ASTM E119 listed in **Appendix A** shall not apply. Where protected openings are limited by Table 705.3, the limitation on the rise of temperature on the unexposed surface of exterior walls as required by ASTM E119 listed in **Appendix A** shall not apply provided that a correction is made for

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radiation from the unexposed exterior wall surface in accordance with the following formula:

$$A_e = A + (A_f \times F_{eo}) \text{ where:}$$

A_e = Equivalent area of protected openings.

A = Actual area of protected openings.

A_f = Area of exterior wall surface in the story under consideration exclusive of openings, on

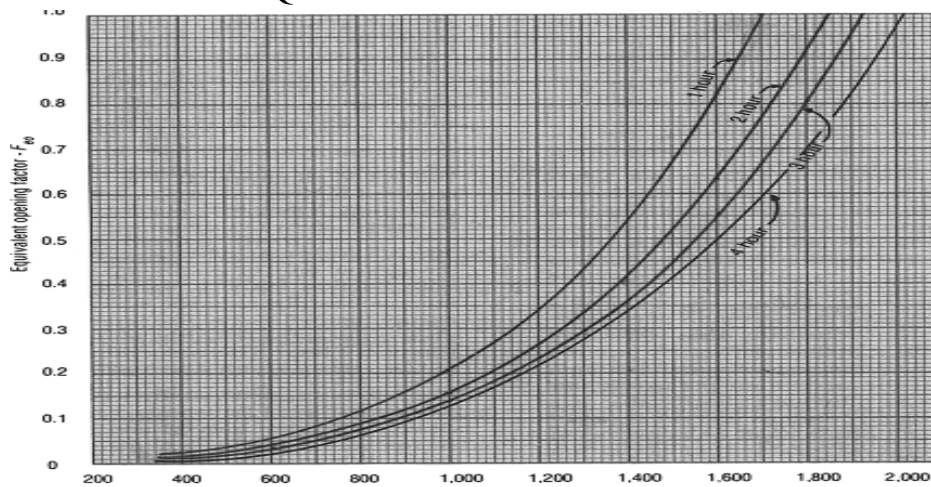
which the temperature limitations of ASTM E119 listed in **Appendix A** for walls is exceeded.

F_{eo} = An "equivalent opening factor" derived from Figure 705.2.4 based on the average temperature of the unexposed wall surface and the fire resistance rating of the wall required by 780 CMR 705.2.

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Figure 705.2.4
EQUIVALENT OPENING FACTOR



1.0

1 hour
2 hour
3 hour
4 hour

Average temperature of unexposed surface (degrees F)

705.3 Openings: The maximum area of unprotected or protected openings permitted in an exterior wall in any story shall not exceed the values set forth in Table 705.3. Where both unprotected and protected openings are located in the exterior wall in any story, the total area of the openings shall comply with the following formula:

$$\frac{A}{a} + \frac{A_u}{a_u} \leq 1.0$$

where:

A = Actual area of protected openings, or the equivalent area of protected openings A_e (see 780 CMR 705.2.4).

a = Allowable area of protected openings.

A_u = Actual area of unprotected openings.

a_u = Allowable area of unprotected openings.

Table 705.3
MAXIMUM AREA OF EXTERIOR WALL
OPENINGS^a

| Classifi- cation of | Fire separation distance (feet) ^e | | | | | | |
|------------------------|--|-----------------|------------------------------|---------------------------------|----------------------------|----------------------------|----------------------------|
| | 0 to 3 | > 3 to 5 | > 5 to 10 ^d | > 10 to 15 ^{c,d} | > 15 to 20 ^c | > 20 to 25 ^c | > 25 to 30 ^c |
| Un- protected | NP | NP ^b | 10% | 15% | 25% | 45% | 70% |
| Protected | NP | 15% | 25% | 45% | 75% | No Limit | No Limit |

NP (Not permitted)

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Note a. Values given are percentages of the area of the exterior wall. This table assumes that the openings are reasonably uniformly distributed. Where openings are not reasonably uniformly distributed, the portion of the wall utilized to calculate compliance with table 705.3 shall be approved.

Note b. For occupancies in Use Group R-3, the maximum percentage of unprotected exterior wall openings shall be 5%.

Note c. The area of openings in an open parking structure with a fire separation distance of greater than ten feet shall not be limited.

Note d. For occupancies in Use Group H-2 or H-3, unprotected openings shall not be permitted for

705.3.2 First story: In all occupancies other than Use Group H, unlimited unprotected openings are permitted in the first story of exterior walls facing a street which have a *fire separation distance* of greater than 15 feet (4572 mm).

705.4 Vertical separation of openings: Openings in exterior walls in adjacent stories shall be separated vertically to protect against fire spread on the exterior of the buildings where the openings are within five feet (1524 mm) of each other horizontally and the opening in the lower story is not a protected opening in accordance with 780 CMR 706.0. Such openings shall be separated vertically at least three feet (914 mm) by spandrel girders, exterior walls or other similar assemblies which have a fire resistance rating of at least one hour or by flame barriers which extend horizontally at least 30 inches (762 mm) beyond the exterior wall. Flame barriers shall also have a fire resistance rating of at least one hour. The unexposed surface temperature limitations specified in ASTM E119 listed in **Appendix A** shall not apply to the flame barriers or vertical separation unless otherwise required by the provisions of 780 CMR.

Exceptions:

1. 780 CMR 705.4 shall not apply to buildings that are three stories or less in *height*.
2. 780 CMR 705.4 shall not apply to buildings equipped throughout with an *automatic sprinkler* system in accordance with 780 CMR 906.2.1.

openings with a fire separation distance of 15 feet or less.

Note e. One foot = 304.8 mm.

705.3.1 Automatic fire suppression: In buildings equipped throughout with an *automatic sprinkler system* in accordance with 780 CMR 906.2.1, the maximum allowable area of unprotected openings in all occupancies other than Use Groups H-1, H-2 and H-3 shall be the same as the tabulated limitations for protected openings.

705.5 Vertical exposure: Approved protectives shall be provided in every opening that is less than 15 feet (4572 mm) vertically above the roof of an adjoining building or adjacent structure which is within a horizontal *fire separation distance* of 15 feet (4572 mm) of the wall in which the opening is located, unless such roof construction affords a fire resistance rating of not less than one hour.

705.6 Continuity of exterior walls: Exterior walls required to be fire resistance rated by 780 CMR 705.2 because of *fire separation distance*, shall be continuous from the foundation to not less than 30 inches (762 mm) above the roof surface.

Exceptions:

1. Where the roof deck or sheathing is constructed of approved noncombustible materials or of fireretardant-treated wood or of ½-inch Type X gypsum board supported directly beneath the underside of the roof sheathing or deck, using minimum two-inch ledgers attached to the sides of the roof framing members for a minimum distance of four feet (1219 mm) from the exterior wall, and where the roof covering has a minimum of a Class C rating, the exterior wall shall be permitted to stop at the underside of the roof deck or sheathing.
2. Exterior walls in buildings not exceeding 1,000 square feet (93 m²) in *area*.
3. Exterior walls of occupancies in Use Group R-3.

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4. Exterior walls of a building where the roof has an angle of more than 20 degrees (0.35 rad) with the horizontal.

780 CMR 706.0 EXTERIOR OPENING PROTECTIVES

706.1 Where required: Exterior opening protectives shall be provided in all exterior wall openings that are required to be protected by 780 CMR 705.0.

706.2 Automatic protection: Approved fire protective assemblies shall be fixed, self-closing or equipped with approved automatic-closing devices and shall conform to the requirements of 780 CMR 706.0 and 780 CMR 702.0, 716.0, 717.0, 718.0 and 719.0.

Exception: Fire protective assemblies are not required where outside automatic *sprinklers* are installed for the protection of the exterior openings. The *sprinklers* shall be installed in accordance with NFPA 13 listed in **Appendix A**, and shall have an *automatic water supply* and be provided with a fire department connection.

706.3 Fireresistance rating: Exterior openings required to be protected by 780 CMR 705.3, when located in a wall required by 780 CMR 705.2 to have a fireresistance rating of greater than one hour, shall be protected with an assembly having a *fire protection rating* of not less than 1½ hours. Exterior openings required to be protected by 780 CMR 705.3, when located in a wall required by 780 CMR 705.2 to have a fireresistance rating of one hour,

Table 707.1
FIRE AND PARTY WALL
FIRERESISTANCE RATINGS

| Use Group ^a | Minimum Fireresistance rating (hours) |
|---|---------------------------------------|
| A-3, A-4, A-5, B, E, F-2, H-4, I-1, I-2, R, S-2 | 2 |
| A-1, A-2, F-1, H-3, I-3, M, S-1 | 3 |
| H-2 | 4 |

shall be protected with an assembly having a *fire protection rating* of not less than ¾ hour. Exterior openings required to be protected by 780 CMR 705.4 or 705.5 shall be protected with an assembly having a *fire protection rating* of not less than ¾ hour.

706.4 Unprotected openings: Where protected openings are not required by 780 CMR 705.0, windows and doors shall be constructed of any approved materials. Glazing shall conform to the requirements of 780 CMR 14, 24 and 26.

780 CMR 707.0 FIRE WALLS AND PARTY WALLS

707.1 General: Walls shall have sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the wall, and shall be constructed of any approved noncombustible materials that provide the required strength and fireresistance rating specified in Table 602 for the type of construction, but not less than the fireresistance rating of the use group specified in Table 707.1. Strength and stability shall comply with the provisions of 780 CMR 14 and 16.

Note a. For requirements for Use Group H-1, see 780 CMR 707.1.1.

707.1.1 Use Group H-1: Occupancies in Use Group H-1 shall not be located in a building that: is more than one story in *height*, has a *basement*; or is attached to another building. An occupancy in any use group other than H-1 shall not be located in a building with an occupancy in Use Group H-1.

Exception: The story *above grade*, where provided with barricaded construction in

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accordance with the fire prevention code listed in **Appendix A**, shall not be considered a *basement*.

707.2 Cutting walls: A wall that is eight inches or less in thickness shall not be cut for chases or socketed for insertion of structural members subsequent to erection (see 780 CMR 2109.1.1).

707.3 Hollow walls: The wall shall not be less than the minimum thickness specified in ACI 530/ASCE 5/TMS 402 listed in **Appendix A**.

707.4 Combustible insulation: The code official shall permit the application of cork, fiberboard or other combustible insulation where laid up without intervening air spaces and attached directly to the face of the wall, and where protected on the exposed surface as provided for in 780 CMR 722.0 and 2309.1.

707.5 Continuity of walls: In all buildings or structures, walls shall be continuous from foundation to two feet eight inches (813 mm) above the roof surface, except as provided for in 780 CMR 707.5.1 through 707.5.3. *Fire walls* shall be made smoke tight at their junction with exterior walls. In exterior wall construction employing studs, the wall shall extend through the stud space to the exterior sheathing.

707.5.1 Noncombustible roofs: The wall is permitted to terminate at the underside of the roof deck where the roof is of approved noncombustible construction and is properly *firestopped* at the wall.

707.5.2 Combustible roofs: The wall is permitted to terminate at the underside of the roof deck in Types 3, 4 and 5 construction where all of the following conditions are met:

1. The wall is properly *firestopped* at the deck.
2. The roof sheathing or deck is constructed of approved noncombustible materials or of fireretardant-treated wood, for a distance of

four feet (1219 mm) on both sides of the wall, or such roof sheathing or deck is constructed with ½-inch Type X gypsum board supported directly beneath the underside of the roof sheathing or deck, using minimum two-inch ledgers attached to the sides of the roof framing members, for a minimum distance of four feet (1219 mm) on both sides of the *fire wall*.

3. Combustible material does not extend through the wall.

4. The roof covering has a minimum of a Class C rating.

707.5.3 Noncombustible frame: The wall shall not be supported on the structural frame in buildings of noncombustible construction unless such supporting frame and all members, which under fire conditions provide lateral support for the frame, have a fire resistance at least equal to that required for the wall.

707.6 Offset fire walls: Where *fire walls* are offset at intermediate floor levels in protected skeleton-frame construction, the offset floor construction and the intermediate wall supports shall be constructed of approved noncombustible materials with a fire resistance rating not less than that required for the *fire wall*.

707.7 Penetrations: Penetrations through fire walls shall meet the limitations specified in 780 CMR 707.7.1 through 707.7.4.

707.7.1 Combustible framing: In addition to the provisions of 780 CMR 2305.6, adjacent combustible members entering into a masonry *fire wall* from opposite sides shall not have less than a four-inch (102 mm) distance between embedded ends. Where combustible members frame into hollow walls or walls of hollow units, all hollow spaces shall be solidly filled for the full thickness of the wall and for a distance not less than four inches (102 mm) above, below and between the structural members, with

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noncombustible materials approved for *firestopping* in accordance with 780 CMR 720.0.

707.7.2 Noncombustible penetrations: Cables and wires without combustible jackets or insulation, and noncombustible pipes, tubes, conduits and vents which penetrate a *fire wall* shall be tested in accordance with ASTM E119

The *through-penetration protection system* shall be tested in accordance with ASTM E814 listed in **Appendix A**, with a minimum positive pressure differential of 0.01 inch of water column (2.5 P) and shall have an "F" rating of not less than the required rating of the wall penetrated.

707.7.3 Combustible penetrations: Cables and wires with combustible jackets or insulation, and combustible pipes, tubes and conduits which penetrate a *fire wall* shall be tested in accordance with ASTM E119 listed in **Appendix A** as part of a fireresistance rated assembly or shall be protected by an, approved *through-penetration protection system* that has been tested in accordance with ASTM E814 listed in **Appendix A**.

The *through-penetration protection system* shall be tested in accordance with ASTM E814 listed in **Appendix A**, with a minimum positive pressure differential of 0.01 inch of water column (2.5 P) and shall have an "F" rating of not less than the required rating of the assembly penetrated.

707.7.4 Electrical outlet boxes: Openings for steel electrical outlet boxes that do not exceed 16 square inches (10323 mm²) in area are permitted provided that the area of such openings does not exceed 100 square inches (64516 mm²) for any 100 square feet (9.3 m²) of wall area. Outlet boxes on opposite sides of the wall shall be separated by a horizontal distance of not less than 24 inches (610 mm).

Exception: Openings for electrical outlet boxes of any material are permitted provided that such boxes are tested for use in

listed in **Appendix A** as part of a rated assembly, or shall be protected by an approved *through-penetration protection system* that has been tested in accordance with ASTM E814 listed in **Appendix A**, or the annular space around the penetrating item shall be protected in accordance with 780 CMR 707.8.

fireresistance rated assemblies and installed in accordance with the tested assembly.

707.8 Annular space protection: Where permitted by 780 CMR 707.7.2 for noncombustible penetrating items, the annular space between the penetrating item and the fireresistance rated assembly being penetrated shall be protected as specified in 780 CMR 707.8.1 and 707.8.2.

707.8.1 Material: The material used to fill the annular space shall comply with 780 CMR 707.8.1.1 or 707.8.1.2.

707.8.1.1 Concrete or masonry assemblies: Penetrations of concrete or masonry assemblies by a maximum six-inch nominal diameter copper, iron or steel pipe, tube, conduit or wires and cables with steel jackets shall be permitted provided that the maximum opening size is 144 square inches (0.09 m²) and the penetration is protected with concrete, grout or mortar for the full thickness of the assembly or the thickness required to provide a fireresistance rating equivalent to the required fireresistance rating of the assembly penetrated.

707.8.1.2 All assemblies: In all assemblies the material shall prevent the passage of flame and hot gases sufficient to ignite cotton waste when subjected to the time-temperature fire conditions of ASTM E119 listed in **Appendix A**, under a minimum positive pressure differential of 0.01 inch of water column (2.5 P) at the location of the penetration for the time period equivalent to

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the required fireresistance rating of the assembly penetrated.

707.8.2 Sleeves: Where sleeves are installed, the sleeves shall be noncombustible and shall be securely fastened to the assembly penetrated. All space between the item contained in the sleeve and the sleeve itself, and any space between the sleeve and the assembly penetrated, shall be filled with a material that complies with 780 CMR 707.8.1.

780 CMR 708.0 FIRE WALL OPENINGS

708.1 General: Openings in *fire walls* shall not exceed the limitations in size and area herein prescribed.

708.2 Size of opening: Each opening through a *fire wall* shall not exceed 120 square feet (11.16 m²). The aggregate width of all openings at any floor level shall not exceed 25% of the length of the wall.

Exception: Openings shall not be limited to 120 square feet (11.16 m²) where both buildings are equipped throughout with an *automatic sprinkler system* installed in accordance with 780 CMR 9.

709.2 Fire area: A *fire separation* assembly which separates adjacent *fire areas* shall have a fireresistance rating of not less than the fireresistance rating required by Table 313.1.2 based on the use group of the *fire areas* which are separated.

709.3 Openings: Openings located in a *fire separation assembly* shall be limited to a maximum aggregate width of 25% of the length of the wall, and the maximum area of any single opening shall not exceed 120 square feet (11 m²). Openings in *exit* enclosures, other than unexposed exterior openings, shall be limited to those necessary for *exit access* to the enclosure from normally occupied spaces and for egress from the enclosure.

Exception: Openings shall not be limited to 120 square feet (11 m²) where adjoining *fire areas* are equipped throughout with an *automatic*

708.2.1 First story: Where the entire first-story floor *areas* on both sides of a *fire wall* are equipped throughout with an approved *automatic sprinkler system* installed in accordance with 780 CMR 906.2.1, the maximum allowable size of openings on the first story of the building shall not exceed 240 square feet (22.32 m²) with a minimum distance of three feet (914 mm) between adjacent openings.

708.3 Opening protectives: All opening protectives in *fire walls* shall comply with the provisions of 780 CMR 704.0 and shall have the minimum *fire protection rating* as set forth in 780 CMR 716.0.

780 CMR 709.0 FIRE SEPARATION ASSEMBLIES

709.1 General: *Fire separation assemblies* installed for purposes of the enclosure of *exits*, floor openings, *shafts*, areas of refuge and for subdividing purposes shall be constructed of approved materials consistent with the limitations for the building type of construction and shall have not less than the fireresistance rating prescribed by Table 602.

sprinkler system installed in accordance with 780 CMR 9.

709.3.1 Protectives: All opening protectives in *fire separation assemblies* shall comply with the provisions of 780 CMR 704.0 and shall have the minimum *fire protection rating* as set forth in 780 CMR 716.0.

709.4 Continuity: All vertical *fire separation assemblies* shall extend from the top of the fireresistance rated floor/ceiling assembly below to the underside of the floor or roof slab or deck above and shall be securely attached thereto. These walls shall be continuous through all concealed spaces such as the space above a suspended ceiling. The supporting construction shall be *protected* to afford the required fireresistance rating of the *fire separation assembly* supported. All hollow vertical

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spaces shall be *firestopped* at every floor level as required in 780 CMR 720.0.

709.5 Exterior walls: Except as provided for in 780 CMR 1014.11.1 and 1014.12.2, where exterior walls serve as a part of a required fireresistance rated enclosure, such walls shall comply with the requirements of 780 CMR 705.0 for exterior walls and the fireresistance rated enclosure requirements shall not apply.

709.6 Penetrations: Penetrations through fireresistance rated wall assemblies shall meet the limitations specified in 780 CMR 709.6.1 through 709.6.5. Penetrations through floor/ceiling and roof/ceiling assemblies shall comply with 780 CMR 713.0. Penetrations of an *exit* enclosure shall also comply with 780 CMR 1014.11.2.

709.6.1 Noncombustible penetrations: Cables and wires without combustible jackets or insulation, and noncombustible pipes, tubes, conduits and vents which penetrate an assembly shall be tested in accordance with ASTM E119 listed in *Appendix A* as part of a rated assembly, or shall be protected by an approved *through-penetration protection system* that has been tested in accordance with ASST. E814 listed in *Appendix A*, or the annular space around the penetrating item shall be protected in accordance with 780 CMR 709.7.

The *through-penetration protection system* shall be tested in accordance with ASTM E814, with a minimum positive pressure differential of 0.01 inch of water column (2.5 P) and shall have an "F" rating of not less than the required rating of the assembly penetrated.

709.6.2 Combustible penetrations: Cables and wires with combustible jackets or insulation, and combustible pipes, tubes, conduits and vents which penetrate an assembly shall be tested in accordance with ASTM E119 listed in *Appendix A* as part of a fireresistance rated assembly or shall be protected by an approved *through-penetration protection system* that has been

tested in accordance with ASTM E814 listed in *Appendix A*.

The *through-penetration protection system* shall be tested in accordance with ASTM E814 with a minimum positive pressure differential of 0.01 inch of water column (2.5 P) and shall have an "F" rating of not less than the required rating of the assembly penetrated.

709.6.3 Electrical outlet boxes: Openings for steel electrical outlet boxes that do not exceed 16 square inches (10323 mm²) in area are permitted provided that the area of such openings does not exceed 100 square inches (64516 mm²) for any 100 square feet (9.3 m²) of enclosure wall area. Outlet boxes on opposite sides of the assembly shall be separated by a horizontal distance of not less than 24 inches (610 mm).

Exception: Openings for electrical outlet boxes of any material are permitted provided that such boxes are tested for installation in fireresistance rated assemblies and installed in accordance with the tested assembly.

709.6.4 Ducts: Ducts that penetrate an assembly shall be provided with approved *fire dampers* that comply with 780 CMR 717.0.

Exception: *Fire dampers* are not required:

1. In steel exhaust air subducts extending at least 22 inches (559 mm) vertically in an exhaust *shaft* and where there is a continuous airflow upward to the outside.
2. In penetrations tested in accordance with ASTM E119 listed in *Appendix A* as a part of the fireresistance rated assembly.
3. In penetrations of walls with a required one-hour fireresistance rating or less by a ducted HVAC system in areas of other than Use Group H where the building is equipped throughout with an *automatic sprinkler system* in accordance with 780 CMR 906.2.1.
4. In garage exhaust or supply *shafts* which are separated from all other building *shafts* by

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not less than a two-hour fireresistance rated *fire separation assembly*.

709.6.5 Single membrane penetrations:

Openings to accommodate noncombustible conduits, pipes and tubes through a single membrane that is an integral component of a fireresistance rated wall assembly shall be permitted provided that the aggregate area of all such openings does not exceed 100 square inches (64516 mm²) in any 100 square feet (9.3 m²) of wall area and the openings are *firestopped* with approved noncombustible materials.

709.7 Annular space protection: Where permitted by 780 CMR 709.6.1 for noncombustible penetrating items, the annular space between the penetrating item and the fireresistance rated assembly being penetrated shall be protected as specified in 780 CMR 709.7.1 through 709.7.3.

709.7.1 Materials: The material used to fill the annular space shall comply with 780 CMR 709.7.1.1 or 709.7.1.2.

709.7.1.1 Concrete or masonry assemblies:

Penetrations of concrete or masonry assemblies by a maximum six-inch nominal diameter copper, iron or steel pipe, tube, conduit or wires and cables with steel jackets shall be permitted provided that the maximum opening size is 144 square inches (0.09 m²) and the penetration is protected with concrete, grout or mortar for the full thickness of the assembly or the thickness required to provide a fireresistance rating equivalent to the required fireresistance rating of the assembly penetrated.

709.7.1.2 All assemblies: In all assemblies, the material shall prevent the passage of flame and hot gases sufficient to ignite cotton waste when subjected to the time-temperature fire conditions of ASTM E119 listed in *Appendix A* under a minimum positive pressure differential of 0.01 inch of water column (2.5 P) at the location of the

penetration for the time period equivalent to the required fireresistance rating of the assembly penetrated.

709.7.2 Sleeves: Where sleeves are installed, the sleeves shall be noncombustible and shall be securely fastened to the assembly penetrated. All space between the item contained in the sleeve and the sleeve itself and any space between the sleeve and the assembly penetrated shall be filled with a material that complies with 780 CMR 709.7.1.

709.7.3 Insulation: Insulation and coverings on the penetrating item shall not pass through the assembly unless these materials maintain the required fireresistance rating of the assembly in accordance with 780 CMR 709.6.2.

780 CMR 710.0 VERTICAL SHAFTS

710.1 General: The provisions of 780 CMR 710.0 shall apply to all vertical *shafts* where such *shafts* are required to protect openings and penetrations through floor/ceiling and roof/ceiling assemblies as required by 780 CMR 713.3 and 713.4.

710.2 Construction: The *shaft* and the *shaft* enclosure shall be constructed of materials permitted by 780 CMR 602.0 for the type of construction of the building. *Shaft* walls which are exterior walls shall be constructed of materials approved for exterior walls in accordance with 780 CMR 14.

710.3 Fireresistance rating: A *shaft* shall be enclosed with *fire separation assemblies* complying with 780 CMR 709.0 having a fireresistance rating of not less than two hours where a *shaft* connects four stories or more and one hour where connecting less than four stories. A *shaft* enclosure shall have a fireresistance rating of not less than the required rating of the floor assembly penetrated but shall not be required to exceed two hours.

Exception: The fireresistance rating of interior *stairway* enclosures shall comply with 780 CMR 1014.11.

710.3.1 Openings in shaft enclosures: Openings other than those necessary for the purpose of the *shaft* shall not be permitted in *shaft* enclosures. Openings in *shaft* enclosures shall be protected with approved opening protectives in accordance with 780 CMR 706.0, 716.0, 717.0 and 718.0.

710.4 Top enclosure: A *shaft* that does not extend to the underside of the roof deck of the building shall be enclosed at the top with a *fire separation assembly* having a fireresistance rating of not less than that required for the *shaft* enclosure walls.

710.5 Bottom enclosure: *Shafts* which do not extend to the bottom of the building shall be enclosed at the lowest level with a *fire separation assembly* having a fireresistance rating of not less than that required for the *shaft* enclosure walls, or shall terminate in a room having an occupancy related to the purpose of the *shaft*. The room shall be separated from the remainder of the building by *fire separation assemblies* having a fireresistance rating with opening protectives of not less than that required for the *shaft* enclosure.

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Exceptions:

1. The fire-resistance rated room separation is not required provided that there are not any openings in or penetrations through the *shaft* enclosure to the remainder of the building except at the bottom. The bottom of the *shaft* shall be closed off around the penetrating items with materials permitted by 780 CMR 720.3 for *draftstopping*, or the room shall be equipped throughout with an *automatic sprinkler system* installed in accordance with 780 CMR 9.
2. The fire-resistance rated room separation and *protection* at the bottom of the *shaft* are not required where there are not any combustible materials in the *shaft* and where there are not any openings in or other penetrations through the *shaft* enclosure to the remainder of the building.

780 CMR 711.0 FIRE PARTITIONS

711.1 General: *Fire partitions* shall be constructed of the types of materials and have the minimum fire-resistance rating as prescribed by Table 602 for the type of construction.

Exception: *Dwelling unit* separations in buildings of Types 2C, 3B and 5B construction shall have fire-resistance ratings of not less than ½ hour in buildings equipped throughout with an *automatic sprinkler system* in accordance with 780 CMR 906.2.1 or 780 CMR 906.2.2, provided that *sprinklers* are installed in all closets located against tenant separation walls and in all bathrooms.

711.2 Corridor walls and tenant and dwelling unit separations: Wall assemblies that are installed as required by Table 602 for *corridor* walls, to separate tenant spaces and to separate *dwelling units*, shall be *fire partitions*.

711.3 Protectives: All opening protectives in *fire partitions* shall comply with the provisions of 780 CMR 704.0 and shall have the minimum fire-resistance rating as set forth in 780 CMR 716.0.

711.4 Continuity: All *fire partitions* shall extend from the top of the floor assembly below to the underside of the floor/roof slab or deck above or to the fire-resistance rated floor/ceiling or roof/ceiling assembly above, and shall be securely attached thereto. The supporting construction shall be protected to afford the required fire-resistance rating of the wall supported, except for *exit access corridor* walls in buildings of Types 2C, 3B and 5B construction and tenant separation walls in covered mall buildings of Type 2C construction. All hollow vertical spaces shall be *firestopped* at every floor level as required in 780 CMR 720.0.

711.5 Exterior walls: Where exterior walls serve as a part of a required fire-resistance rated enclosure, such walls shall comply with the requirements of 780 CMR 705.0 for exterior walls and the fire-resistance rated enclosure requirements shall not apply.

711.6 Penetrations: Penetrations through assemblies shall comply with 780 CMR 709.6 through 780 CMR 709.7.3.

Exception: In occupancies in other than Use Group H, *fire dampers* are not required:

1. At penetrations of tenant separation and *corridor* walls in buildings equipped throughout with an *automatic sprinkler system* in accordance with 780 CMR 906.2.1.
2. At penetrations of *corridor* walls where the ducts are constructed of steel and do not have openings which communicate the *corridor* with adjacent spaces or rooms.

780 CMR 712.0 SMOKE BARRIERS

712.1 Where required: Smoke barriers shall be provided as required in 780 CMR 409.4 for occupancies in Use Group I-2 and 780 CMR 410.6 for occupancies in Use Group I-3.

712.2 Construction: Smoke barriers shall have a fire-resistance rating of not less than one hour. Such barriers shall form an effective membrane continuous

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from outside wall to outside wall and from floor slab to floor or roof deck above, including continuity through all concealed spaces, such as the space above suspended ceilings, and including interstitial structural and mechanical spaces. Transfer grilles, whether equipped with fusible link-operated dampers or not, shall not be installed in these partitions. The supporting construction shall be protected to afford the required fire resistance rating of the wall supported in buildings of other than Types 2C, 3B and 5B construction.

Exceptions:

1. Smoke barriers are not required in interstitial spaces where such spaces are designed and constructed with ceilings that provide resistance to the passage of fire and smoke equivalent to that provided by the smoke barriers.
2. Horizontal sliding doors that comply with 780 CMR 1017.4.4.

712.4 Opening protectives: Doors in smoke barriers shall have a *fire protection rating* of not less than 20 minutes in accordance with 780 CMR 716.0. Double *means of egress corridor* doors shall have vision panels of ¼-inch-thick *labeled* wired glass mounted in approved steel frames in accordance with 780 CMR 716.0. The doors shall close the openings with only the clearance necessary for proper operation under self-closing or automatic-closing operations and shall be without undercuts, louvers or grilles. Rabbets or astragals are required at the meeting edges of double *means of egress* doors, and stops are required on the head and jambs of all doors in smoke barriers. Positive latching devices are required on double *means of egress corridor* doors.

Exceptions:

1. In occupancies in Use Group I-2, double *means of egress* cross-corridor doors shall be 1¾-inch solid core wood or steel doors. Positive latching devices are not required on double *means of egress* cross-corridor doors, and center mullions are prohibited.

2. Smoke barriers in occupancies in Use Group I-3 are permitted to be constructed of nominal 0.10-inch-thick steel plate.

712.3 Doors: Doorways separating *corridors* in adjoining *smoke compartments* shall be equipped with a pair of swinging-type doors, each swinging in a direction opposite from the other, and the minimum width of each door leaf shall be 44 inches (1118 mm) for *corridors* utilized for the movement of beds and 34 inches (864 mm) for other *corridors*. Other doors in smoke barriers shall be of the swinging type of required width.

Exceptions:

1. Horizontal sliding doors that comply with 780 CMR 410.0 are permitted in smoke barriers in occupancies in Use Group I-3.
2. Security glazing protected on both sides by an *automatic sprinkler system* shall be permitted in doors and windows in smoke barriers in occupancies in Use Group I-3. Individual panels of glazing shall not exceed 1,296 square inches (0.84 m²), shall be in a gasketed frame and installed in such a manner that the framing system will deflect without breaking (loading) glazing before the *sprinkler* system operates. The *sprinkler* system shall be designed to wet completely the entire surface of the affected glazing when actuated.

712.4.1 Door closers: Doors in smoke barriers shall be provided with approved door hold-open devices of the failsafe type which shall release the doors, causing them to close upon the actuation of smoke detectors as well as upon the application of a maximum manual pull of 50 pounds (244 N) against the hold-open device.

Exception: Doors in smoke barriers in occupancies in Use Group I-3 shall be self-closing or automatic-closing by smoke detection.

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712.5 Smoke damper: An approved damper designed to resist the passage of smoke shall be provided at each point a duct penetrates a smoke barrier. The damper shall close upon detection of smoke by an approved smoke detector located within the duct.

Exceptions:

1. In lieu of an approved smoke detector located within the duct, ducts that penetrate smoke barriers above smoke barrier doors that are required by 780 CMR 712.4 shall have the approved damper arranged to close upon detection of smoke by the local device designed to detect smoke on either side of the smoke barrier door opening.
2. Dampers at the smoke barrier in a fully ducted system are not required.

780 CMR 713.0 FLOOR/CEILING AND ROOF/CEILING ASSEMBLIES

713.1 General: All floor and roof assemblies shall comply with the applicable provisions of 780 CMR and shall have a fire resistance rating of not less than the fire resistance rating required in 780 CMR 602.0.

Exception: *Dwelling unit* separations in buildings of Types 2C, 3B and 5B construction shall have fire resistance ratings of not less than ½ hour in buildings equipped throughout with an *automatic sprinkler system* in accordance with 780 CMR 906.2.1 or 780 CMR 906.2.2, provided that *sprinklers* are installed in all closets located against tenant separation walls and in all bathrooms.

1. A floor opening serving and contained within a single *dwelling unit* and connecting four stories or less.
2. A floor opening which:
 - 2.1. Is not part of the required *means of egress*;
 - 2.2. Is not concealed within the building construction;

713.1.1 Ceiling panels: Where the weight of lay-in ceiling panels, used as part of fire resistance rated floor/ceiling or roof/ceiling assemblies, is not adequate to resist an upward force of 1 psf (5 kg/m²), wire or other approved devices shall be installed above the panels to prevent vertical displacement under such upward force.

713.1.2 Unusable space: In an assembly required to have a one-hour fire resistance rating, the ceiling membrane of a fire resistance rated assembly is not required to be installed where unusable space occurs below the assembly, or the flooring is not required to be installed where unusable space occurs above the assembly.

713.2 Continuity: All floor/ceiling and roof/ceiling assemblies shall be continuous without openings or penetrations except as permitted by 780 CMR 713.0. Floor assemblies which are required to be fire resistance rated shall extend to and be tight against exterior walls, or other provisions shall be made for maintaining the fire resistance rating of the assembly at such locations. Penetrations through a roof deck to the outside are permitted provided that the required fire resistance rating of the roof construction is maintained. All concealed spaces and openings shall be *firestopped* and *draftstopped* in accordance with 780 CMR 720.0.

713.3 Floor opening enclosure: All floor openings connecting two or more stories shall be protected by a *shaft* enclosure that complies with 780 CMR 710.0.

Exceptions: A *shaft* enclosure is not required for any of the following floor openings:

- 2.3. Does not connect more than two stories;
- 2.4. Is separated from other floor openings serving other floors by construction conforming to 780 CMR 710.3; and
- 2.5. Is not open to a *corridor* in occupancies in Use Groups I and R, or is not open to a *corridor* on a floor not equipped throughout

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with an approved *automatic fire suppression system* in other use groups.

3. A floor opening in a mall that complies with 780 CMR 402.0.
4. A floor opening between a *mezzanine* that complies with 780 CMR 505.0, and the floor below.
5. An atrium that complies with 780 CMR 404.0.
6. A floor opening in an open parking structure that complies with 780 CMR 406.0.
7. An approved masonry chimney where annular space protection is provided for in accordance with 780 CMR 720.6.4.
8. A *shaft* enclosure for an *escalator* floor opening is not required where a *shaft* enclosure is not required for floor openings in accordance with 780 CMR 713.3 or where the building is equipped throughout with an *automatic sprinkler system* in accordance with 780 CMR 906.2.1 and the *escalator* opening is protected in accordance with 780 CMR 713.4.3.4 or 713.4.3.5.
9. A floor opening that complies with 780 CMR 410.5 in an occupancy in Use Group I-3.
10. Noncombustible *shafts* connecting communicating floor levels in an occupancy in Use Group I-3 where the area complies with 780 CMR 410.5. Where additional stories are located above or below, the *shaft* shall be permitted to continue with fire and smoke damper protection provided at the fireresistance rated floor/ceiling assembly between the noncommunicating stories.
11. A single floor opening containing a *stairway* which is not a required *means of egress* in an occupancy in Use Group B and complying with the following parameters:
 - 11.1. The *stairway* does not connect more than six floor levels.
 - 11.2. The *stairway* does not connect with an *exit access corridor*.
 - 11.3. The *stairway* floor opening shall not exceed 160 square feet (15 m²).
 - 11.4. The *stairway* floor opening shall be protected in the same manner as an *escalator*

floor opening complying with 780 CMR 713.3 Exception 8, and 524 CMR.

- 11.5. The building is equipped throughout with an approved *automatic sprinkler system* in accordance with 780 CMR 906.2.1.

713.4 Penetration protection: All penetrations of a floor/ceiling assembly or the ceiling membrane of a roof/ceiling assembly shall be protected by a *shaft* enclosure that complies with 780 CMR 710.0.

Exceptions:

1. Penetrations within and through a floor opening permitted to be unenclosed by 780 CMR 713.3.
2. Penetrations through assemblies required to be fireresistance rated and complying with 780 CMR 713.4.1 or 780 CMR 713.4.2.
3. Penetrations through assemblies without a required fireresistance rating and complying with 780 CMR 713.4.1 or 780 CMR 713.4.3.

713.4.1 Through-penetration system: A *shaft* enclosure shall not be required where cables, cable trays, conduits, tubes or pipes penetrate a floor assembly and are protected with an approved *through-penetration protection system* tested in accordance with ASTM E814 listed in **Appendix A**. The positive pressure differential between the exposed and unexposed surfaces of the test assembly shall not be less than 0.01-inch water gage (2.5 P). The system shall have an "F" rating and a "T" rating of not less than 1 hour but not less than the required fireresistance rating of the assembly being penetrated. All penetrations through a ceiling that is an integral component of a fireresistance rated floor/ceiling or roof/ceiling assembly, shall comply with 780 CMR 713.4.2.

Exceptions:

1. A "T" rating shall not be required for floor penetrations that are contained and located within the cavity of a wall.
2. A "T" rating shall not be required for floor penetrations by pipe, tube and conduit that

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are not in direct contact with combustible material.

713.4.2 Fireresistance rated assemblies: The required fireresistance rating of floor/ceiling and roof/ceiling assemblies shall be determined in accordance with ASTM E119 listed in *Appendix A*. Except where permitted by 780 CMR 713.4.2.1 through 713.4.2.3, penetrations for electrical, mechanical, plumbing

1. Outlet boxes and fittings are permitted, provided that such devices are listed for installation in fireresistance rated assemblies and are installed in accordance with the listing.
2. Ceiling dampers shall not be required where fire tests have shown that such dampers are not necessary in order to maintain the fireresistance rating of the assembly.

713.4.2.1 Noncombustible penetrations: Penetrations by noncombustible vents, chimneys, conduits, pipes and tubes through a fireresistance rated floor assembly which connect not more than two stories are permitted. Penetrations by noncombustible conduit, pipe and tubes through a fireresistance rated floor assembly which connect more than two stories are permitted provided that the aggregate area of the penetrating items shall not exceed one square foot (0.09 m²) in any 100 square feet (9.3 m²) of floor area. In all cases, the annular space between the penetrating item and the assembly shall be protected in accordance with 780 CMR 707.8.

713.4.2.2 Air ducts: Penetrations by an air duct or plenum through a fireresistance rated floor assembly, which connect not more than two stories, are permitted where a *fire damper* that complies with 780 CMR 717.0 is installed at the floor line. A *fire damper* is not required at penetrations of a roof/ceiling

and communication conduits, pipes and systems shall be installed in accordance with the approved ASTM E119 rated assembly. In the case of ceilings that are an integral component of a fireresistance rated floor/ceiling or roof/ceiling assembly, all penetrations shall be installed in accordance with the approved ASTM E119 rated assembly or 780 CMR 713.4.2.3.

Exceptions:

assembly where ducts are open to the atmosphere.

713.4.2.3 Ceiling penetrations: In the case of ceilings that are an integral component of a fireresistance rated floor/ceiling or roof/ceiling assembly, openings to accommodate noncombustible conduits, pipes, tubes, electrical outlets or air ducts shall be permitted provided that the aggregate area of such openings does not exceed 100 square inches (0.065 m²) in any 100 square feet (9.3 m²) of ceiling area. The space around noncombustible conduits, pipes, tubes and electrical outlet boxes at the ceiling penetration shall be *firestopped* in accordance with 780 CMR 720.6.4 or shall be protected in accordance with 780 CMR 709.7 or 780 CMR 713.4.1. For noncombustible air duct penetrations, an approved ceiling damper shall be installed at the ceiling line. Ceiling dampers shall be constructed in accordance with the details listed in a fireresistance rated design or shall be *labeled* to function as a heat barrier for air-handling outlet/inlet penetrations in the ceiling of a fireresistance rated assembly.

713.4.3 Nonfireresistance rated assemblies: Penetrations of floor assemblies without a required fireresistance rating shall conform to 780 CMR 713.4.3.1 through 713.4.3.3. All penetrations through the ceiling membrane of a roof assembly without a required fireresistance rating shall be protected in accordance with 780 CMR 720.6.4.

713.4.3.1 Noncombustible penetrations:

Penetrations by noncombustible vents, chimneys, conduits, pipes and tubes through unprotected floor assemblies which connect not more than three stories are permitted provided that the annular space between the penetrating item and the floor is protected in accordance with 780 CMR 720.6.4.

713.4.3.2 Air ducts: Penetrations by noncombustible air ducts through unprotected floor assemblies which connect not more than three stories are permitted provided that a *fire damper* complying with 780 CMR 717.0 is installed at each floor line.

713.4.3.3 Noncombustible or combustible penetrations: Penetrations by vents, chimneys, cables, wires, air ducts, conduits, pipes and tubes through an unprotected floor assembly which connect not more than two stories are permitted provided that the annular space is protected in accordance with 780 CMR 720.6.4.

713.4.3.4 Escalators/automatic fire shutter: *Escalators* shall be equipped with a power-operated automatic shutter at every floor pierced thereby, constructed of approved noncombustible materials with a fire protection rating of not less than 1½ hours. The shutter shall close immediately upon the automatic detection of fire and smoke by an approved device and shall completely shut off the well opening. The shutter shall operate at a speed of not more than 30 feet per minute (0.15 m/s) and shall be equipped with a sensitive leading edge to arrest the shutter's progress when in contact with any obstacle, and to continue the shutter's progress on release therefrom. Refer to 780 CMR 713.3, Exception 8.

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713.4.3.5 Escalators/water curtain: The area of the floor opening shall not exceed twice the horizontal projected area of the *escalator* and the opening shall not connect more than four stories in occupancies in other than Use Groups B and M and the opening shall be protected by a draft curtain and a closed *sprinkler* water curtain conforming to NFPA 13 listed in **Appendix A**. Refer to 780 CMR 713.3, Exception 8

enclosing stadiums of Type 1 or Type 2 construction, shall be of approved noncombustible materials without a specified fire resistance rating or of Type 4 construction.

714.3 Roofs 20 feet or higher: Where every part of the structural framework of roofs in buildings of Type 1 or Type 2 construction is 20 feet (6096 mm) or more above the floor immediately below, omission of all fire *protection* of the structural members is permitted, including the *protection* of trusses, roof framing and decking.

780 CMR 714.0 ROOF CONSTRUCTION

714.1 General: Roofs shall be constructed of materials or assemblies of materials designed to afford the fire resistance rating required by Table 602 as herein modified.

714.2 Stadiums: The roof construction, including beams, trusses, framing, arches and roof decks,

714.4 Roof slabs, arches and decking: Where the omission of fire *protection* from roof trusses, roof framing and decking is permitted, roofs in buildings of Types 1 and 2 construction shall be constructed of noncombustible materials, or of fire-retardant-treated wood as permitted in Table 602, without a specified fire resistance rating, or of Type 4 construction in

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buildings not over five stories or 65 feet (19812 mm) in *height*.

714.5 Firestopping: *Firestopping* of ceiling and *attic* spaces shall be provided as required by 780 CMR 720.0.

780 CMR 715.0 FIRERESISTANCE RATING OF STRUCTURAL MEMBERS

715.1 Requirements: The fireresistance rating of structural members and assemblies shall comply with the requirements for the type of construction and shall not be less than the rating required for the fireresistance rated assemblies supported, except as provided for in 780 CMR 711.4 for support of *exit access corridor* walls and tenant separation walls in covered mall buildings, and in 780 CMR 712.2 for support of smoke barriers. The maximum required fireresistance rating of structural members supporting *fire separation assemblies* of tank storage areas as provided for in 780 CMR 418.3.2.1 shall be two hours, but not less than required by Table 602 for the building construction type.

715.2 Protection of structural members: Columns, girders, trusses, beams, lintels or other structural members which are required to have a fireresistance rating and which support more than two floors or one floor and roof, or support a loadbearing wall or a nonloadbearing wall more than two stories high, shall be individually *protected* on all sides for the full length or *height* with materials having the required fireresistance rating. All other structural members required to have a fireresistance rating shall be *protected* by individual encasement, by a membrane or ceiling protection as specified in 780 CMR 713.0, or by a combination of both.

715.3 Embedments and enclosures: Pipes, wires, conduits, ducts or other service facilities shall not be embedded in the required fire protective covering of a structural member that is required to be individually encased.

715.4 Impact protection: Where the fire protective covering of a structural member is subject to impact damage from moving vehicles, the handling of merchandise or other activity, the fire protective covering shall be protected by corner guards or by a substantial jacket of metal or other noncombustible material to a height adequate to provide full protection, but not less than five feet (1524 mm) from the finished floor.

715.5 Exterior structural members: Structural members located in exterior walls or along the outer lines of a building or structure shall be *protected* as required by Table 602 for exterior loadbearing walls for the type of construction involved and shall be protected against corrosion in accordance with 780 CMR 2210.1. The interior faces of exterior structural members shall be *protected* with coverings of not less than the required fireresistance rating specified for interior structural members in Table 602. Where a fireresistance rating is required in Table 602 for exterior loadbearing walls in buildings of Types 2C, 3B and 5B construction, the interior faces of any exterior structural member of such buildings shall be *protected* to provide a fireresistance rating not less than that required for exterior load-bearing walls.

715.6 Bottom flange protection: Fire protection is not required for the bottom flange of lintels, shelf angles and plates which are not a part of the structural frame or which have a span of six feet (1829 mm) or less.

715.7 Stone lintels: Stone lintels on spans exceeding four feet (1219 mm) shall not be permitted, unless supplemented by fireresistance rated structural members or masonry arches of the required strength to support the superimposed *loads*.

780 CMR 716.0 FIRE DOOR ASSEMBLIES

716.1 Fire door assemblies: Approved *fire door* assemblies as defined in 780 CMR shall be constructed of any material or assembly of component materials which conforms to the test requirements of ASTM E152 listed in **Appendix A**

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and the *fire protection rating* herein required in Table 716.1, unless otherwise specifically provided for in 780 CMR.

716.1.1 Twenty-minute doors: *Fire doors* having a *fire protection rating* of 20 minutes shall be tested in accordance with ASTM E152 listed in *Appendix A* without the hose stream test.

716.1.2 Doors in exit enclosures: All doorway opening protectives for *exit* enclosures shall be *labeled means of egress fire doors* and shall have a maximum transmitted temperature end point of not more than 450°F (232°C) above ambient at the end of 30 minutes of standard fire test exposure.

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Table 716.1
OPENING PROTECTIVE FIRE
PROTECTION RATING

| Type of assembly | Required assembly rating (hour) | Minimum opening protection assembly (hour) |
|--|---------------------------------|--|
| Fire walls and fire separation assemblies having a required fire resistance rating greater than one hour | 4 3 2 1½ | 3 3 1½ 1½ |
| Fire separation assemblies: Shaft and exit enclosure walls | 1 | 1 |
| Other fire separation assemblies | 1 | ¾ |
| Fire partitions: | | |
| Exit access corridor enclosure wall | 1 ½ | ? ^a ? ^a |
| Other fire partitions | 1 | ¾ |

Note a. For testing requirements, see 780 CMR 716.1.1.

716.2 Labeled protective assemblies: All *fire door* assemblies shall be *labeled* by an *approved agency*. *Labeled* protective assemblies that conform to the requirements of 780 CMR 716.0 or UL 10A, 14B and 14C for tin-clad *fire door* assemblies, and NFPA 80 listed in **Appendix A**, shall be approved for use as provided for in 780 CMR.

716.2.1 Labeling requirements: *Fire doors* shall have a *label* or other identification showing the name of the manufacturer, the *fire protection rating* and, where required for *fire doors* in *exit enclosures* by 780 CMRs 716.1.2 or 1014.8.3, the maximum transmitted temperature end point. Such *label* shall be approved and shall be permanently affixed. The *label* shall be applied at the factory where fabrication and assembly are done. Inspection shall be made by an *approved agency*.

716.2.2 Oversized doors: Approval of doors which cannot be *labeled* because of size shall be

based on a certificate of inspection furnished by an *approved testing agency* for such oversized doors. The certificate shall state that the door conforms to the requirements of design, materials and construction, but has not been subjected to the fire test.

716.3 Multiple doors in fire walls: Two doors, each with a *fire protection rating* of 1½ hours, installed on opposite sides of the same opening in a *fire wall*, shall be deemed equivalent in *fire protection rating* to one three-hour *fire door*.

716.4 Glass panels: Wired glass panels shall be permitted in *fire doors* within the limitations of 780 CMR 719.0 and as herein specifically prescribed.

716.5 Door closing: *Fire doors* shall be self-closing or automatic-closing in accordance with the requirements of NFPA 80 listed in **Appendix A** and the requirements of 780 CMR 716.5.1 through 716.5.4.

716.5.1 Smoke-activated doors: *Fire doors* which are not self-closing and which protect openings in *horizontal exits*, *exits* or *exit access corridors* required to be of fire resistance rated construction shall be automatic-closing by the actuation of smoke detectors or by loss of power to the smoke detector or the hold-open device.

716.5.2 Doors in pedestrian ways: Vertical sliding or vertical rolling steel *fire doors* in openings through which pedestrians travel shall not be automatic-closing by actuation of smoke detectors.

Exception: Doors that are activated by smoke detectors arranged on an *alarm verification* circuit in accordance with 780 CMR 918.7.

716.5.3 Swinging fire doors: The door closers for swinging *fire doors* that are not required to be automatic-closing by smoke detector activation in accordance with 780 CMR 716.5.1,

shall be permitted to be activated by a single fusible link incorporated in the hold-open arm of an approved door closer where the ceiling is less than three feet (914 mm) above each side of the door opening.

716.5.4 Closing time: Doors that are automatic-closing by *automatic fire detectors* or are self-closing shall not have a delay in the initiation of closing or reclosing of more than ten seconds.

780 CMR 717.0 FIRE DAMPERS

717.1 Approval: *Fire dampers* shall comply with the requirements of UL 555 listed in **Appendix A** and shall bear the *label* of an *approved testing agency*. *Fire dampers* shall be classified and identified in accordance with UL 555. *Fire dampers* installed in systems that continue to operate when smoke or heat from a fire is detected shall be *labeled* for installation in dynamic systems as required by UL 555. *Fire dampers* shall be installed in accordance with manufacturer's installation instructions. *Fire dampers* shall have the minimum *fire protection rating* specified in Table 717.1 for the type of penetration.

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Table 717.1
FIRE DAMPER RATING

| Type of Penetration | Minimum damper rating (hour) |
|--|------------------------------|
| Fire partitions less than 1 hour | 1/2 |
| Unprotected floor assemblies (see 780 CMR 713.4.3.2) | |
| Single membrane of a 1-hour fire-resistance rated assembly | |
| 1-hour fire-resistance rated assemblies | 1 |
| 2-hour fire-resistance rated assemblies | 1 1/2 |
| 3-hour or greater fire-resistance rated assemblies | 3 |

717.2 Where required: *Fire dampers* shall be provided at locations required by 780 CMR where air distribution system penetrate assemblies required to have a fire-resistance rating. Where the installation of a *fire damper* will interfere with the operation of a required smoke control system in accordance with 780 CMR 921.0 or the operation of an exhaust system conveying *hazardous materials* as defined in the mechanical code listed in **Appendix A**, approved alternative protection shall be utilized.

717.3 Access: Access shall be provided to *fire dampers* for inspection and servicing.

780 CMR 718.0 FIRE WINDOWS AND SHUTTERS

718.1 Fire-resistance rating: Approved assemblies of *fire windows* and fire shutters shall meet the test requirements of ASTM E163 listed in **Appendix A**. *Fire windows* shall be in the fixed closed position or be automatic-closing.

718.1.1 Exception: Steel window frame assemblies of 3/8-inch (3 mm) minimum solid section or of not less than nominal 0.048-inch-thick formed sheet steel members *fabricated* by pressing, mitering, riveting, interlocking or

welding and having provision for glazing with 1/4-inch wired glass as required in 780 CMR 719.0 where securely installed in the building construction and glazed with 1/4-inch *labeled* wired glass, shall be deemed to meet the requirements for a 3/4-hour *fire window* assembly.

718.2 Window mullions: All metal mullions which exceed a nominal height of 12 feet shall be protected with materials to afford the same fire-resistance rating as required for the wall construction in which the protective is located.

718.3 Swinging fire shutters: Where fire shutters of the swinging type are installed in exterior openings, not less than one row in every three vertical rows shall be arranged to be readily opened from the outside, and shall be identified by distinguishing marks or letters not less than six inches (152 mm) high.

718.4 Rolling fire shutters: Where fire shutters of the rolling type are installed, such shutters shall be of approved counter-balanced construction and capable of being readily opened from the outside.

780 CMR 719.0 WIRED GLASS

719.1 General: Wired glass installed as an opening protective shall be tested in accordance with ASTM E163 listed in **Appendix A**, shall bear the *label* of an *approved agency* and shall be installed in approved frames. Wired glass panels shall conform to the size limitations set forth in Table 719.1.

Table 719.1
LIMITING SIZE^a OF WIRED GLASS PANELS

| Opening fire protection rating | Maximum area (square inches) | Maximum height (inches) | Maximum width (inches) |
|------------------------------------|------------------------------|-------------------------|------------------------|
| 3 hour | 0 | 0 | 0 |
| 1 1/2-hour doors in exterior walls | 0 | 0 | 0 |
| 1 and 1 1/2 hours | 100 | 33 | 10 |

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| | | | |
|--------------|-------------|-------------|-------------|
| ¾ hour | 1,296 | 54 | 54 |
| ? hour | not limited | not limited | not limited |
| Fire windows | 1,296 | 54 | 54 |

Note a. 1 Inch = 25.4 mm: 1 square inch = 0.0006452 m².

719.1.1 Fire walls: Wired glass in *fire doors* located in *fire walls* shall be prohibited except that where serving as a *horizontal exit*, a self-closing swinging door shall be permitted to have a vision panel of not more than 100 square inches (0.065 m²) without a dimension exceeding ten inches (254 mm).

719.1.2 Fire separation assemblies: Wired glass vision panels shall not be installed in *fire doors*

719.3 Fire separation assemblies: Panels of ¼-inch wired glass shall not be installed in *fire separation assemblies* intended for subdividing purposes as set forth in 780 CMR 709.1 where the required fireresistance rating of the wall exceeds one hour. The maximum size of such panels shall not exceed the limitations for a ¾-hour door.

780 CMR 720.0 FIRESTOPPING AND DRAFTSTOPPING

720.1 General: To prevent the free passage of flame and products of combustion through concealed spaces or openings in the event of fire, provisions shall be made to provide effective *firestops* or *draftstops* as herein specified.

720.2 Firestopping materials: All *firestopping* shall consist of approved noncombustible materials securely fastened in place. *Firestops* of approved noncombustible materials or of materials of two thicknesses of one-inch lumber with broken lap-joint, or one thickness of 23/32-inch wood structural panel with joints backed by 23/32-inch wood structural panel, or of two-inch lumber installed with tight joints, shall be installed in open spaces of wood framing.

720.3 Draftstopping materials: *Draftstopping* materials shall not be less than ½ -inch gypsum

having a 1½-hour *fire protection rating* intended for installation in *fire separation assemblies*, unless the glass panels are not more than 100 square inches (0.065 m²) in area.

719.2 Exit and elevator protectives: Except where *fire doors* are specifically required by 780 CMR 4 to be solid in such locations where unusually hazardous conditions prevail, approved wired glass vision panels used in *fire doors* in elevator and *stairway shaft* enclosures shall be so located as to furnish clear vision of the passageway or approach to the elevator or *stairway* and shall not exceed the size limitations specified in Table 719.1.

board, ?-inch plywood or other approved materials adequately supported.

720.4 Integrity: The integrity of all *firestopping* and *draftstopping* shall be continuously maintained.

720.5 Required inspection: *Firestopping* and *draftstopping* shall not be concealed from view until inspected and approved.

720.6 Firestopping required: *Firestopping* shall be installed in the locations specified in 780 CMR 720.6.1 through 720.6.7.

720.6.1 Concealed wall spaces: *Firestopping* shall be installed in concealed spaces of stud walls and partitions, including furred or studded-off spaces of masonry or concrete walls, and at the ceiling and floor or roof levels. *Firestopping* is not required at the ceiling level of walls, partitions and furred spaces constructed of noncombustible materials as defined by 780 CMR 704.4.

720.6.2 Connections between horizontal and vertical spaces: *Firestopping* shall be installed at all interconnections between vertical and horizontal spaces such as occur at soffits over cabinets, drop ceilings, cove ceilings and similar locations.

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720.6.3 Stairways: *Firestopping* shall be installed in concealed spaces between stairway stringers at the top and bottom of the run.

720.6.4 Ceiling and floor openings: Where permitted by Exception 7 of 780 CMR 713.3, or by 780 CMR 713.4.2.3 or 713.4.3, *firestopping* shall be installed at openings around vents, pipes, ducts, chimneys and fireplaces at ceiling and floor levels, with approved noncombustible materials. Factory built chimneys and fireplaces shall be *firestopped* in accordance with UL 103 and UL 127 listed in *Appendix A*. Where ceilings or floors are required to be fireresistance rated, the openings around vents, pipes, ducts, chimneys and fireplaces shall be protected in accordance with the requirements of 780 CMR 713.4 through 713.4.2.3.

720.6.5 Architectural trim: *Firestopping* shall be installed in exterior cornices and other exterior architectural elements where permitted of combustible construction in 780 CMR 1406.0, or where erected with combustible frames, at maximum intervals of 20 feet (6096 mm). If noncontinuous, such elements shall have closed ends, with at least four inches (102 mm) of separation between sections.

720.6.6 Combustible finish and trim: *Firestopping* shall be installed in the space behind combustible trim and finish where permitted under 780 CMR and all other hollow spaces where permitted in fireresistance rated construction at ten-foot (3048 mm) intervals; or the space shall be solidly filled with approved noncombustible materials.

720.7.1.2 Use Group R-3: In occupancies in Use Group R-3, the space shall be divided into approximately equal areas not greater than 500 square feet (46.5 m²). The *draftstopping* shall be installed parallel to the main framing members.

720.6.7 Concealed sleeper spaces: *Firestopping* shall be installed in concealed spaces formed by floor sleepers in areas of not more than 100 square feet (9.30 m²); or the space shall be solidify filled with approved noncombustible materials.

720.7 Draftstopping required: *Draftstopping* shall be installed in buildings of Types 3, 4 and 5 construction in the locations specified by 780 CMR 720.7.1 and 720.7.2.

720.7.1 Floors: Where ceilings are suspended below solid wood joists or suspended or attached directly to the bottom of open-web wood floor trusses, the space between the ceiling and the floor above shall be divided by *draftstopping* as specified in 780 CMR 720.7.1.1 through 720.7.1.3.

720.7.1.1 Use Groups R-1 and R-2: In occupancies in Use Groups R-1 and R-2, *draftstopping* shall be installed in line with tenant and *dwelling unit* separation walls where the walls do not extend to the underside of the floor sheathing above.

Exception: *Draftstopping* is not required in buildings equipped throughout with an *automatic sprinkler system* installed in accordance with 780 CMR 906.2.1 or 906.2.2, provided that automatic *sprinklers* are also installed in the combustible concealed space.

Exception: *Draftstopping* is not required in buildings equipped throughout with an *automatic sprinkler system* installed in accordance with 780 CMR 906.2.1 or 906.2.2, provided that automatic *sprinklers* are also installed in the combustible concealed space.

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720.7.1.3 Other use groups: In all other use groups, *draftstopping* shall be installed so that horizontal areas do not exceed 1,000 square feet (93 m²).

Exception: *Draftstopping* is not required in buildings equipped throughout with an *automatic sprinkler system* installed in accordance with 780 CMR 906.2.1 or 906.2.2, provided that automatic *sprinklers* are also installed in the combustible concealed space above the ceiling.

720.7.2 Attics and concealed spaces: *Attics* and concealed roof spaces shall be provided with *draftstopping* as specified in 780 CMR 720.7.2.1 and 720.7.2.2.

720.7.2.1 Use Group R: In occupancies in Use Group R, in *attics*, mansards, overhangs or other concealed roof spaces, *draftstopping* shall be installed above, and in line with, tenant and *dwelling unit* separation walls that do not extend to the underside of the roof sheathing above.

Exceptions:

1. Where *corridor* walls provide a tenant or *dwelling unit* separation, *draftstopping* shall only be required above one of the *corridor* walls.
2. Flat roofs with solid joist construction are not required to be provided with *draftstopping* over tenant and *dwelling unit* separation walls if the joists form a *draftstop*.
3. *Draftstopping* is not required in buildings equipped throughout with an *automatic sprinkler system* installed in accordance with 780 CMR 906.2.1 or 906.2.2, provided that automatic *sprinklers* are also installed in *attics*, mansards, overhangs and other concealed roof spaces of combustible concealed space.

4. *Draftstopping* is not required in detached *one- and two-family dwellings*.

5. In occupancies in Use Group R-2 which do not exceed four stories in *height*, the *attic* space shall be subdivided by *draftstops* into areas not exceeding 3,000 square feet (279 m²) or above every two *dwelling units*, whichever is smaller.

720.7.2.2 Other use groups: *Draftstopping* shall be installed in *attics* and concealed roof spaces, such that any horizontal area does not exceed 3,000 square feet (279 m²).

Exceptions:

1. Flat roofs with solid joist construction are not required to be provided with *draftstopping* over tenant separation walls if the joists form a *draftstop*.
2. *Draftstopping* is not required in buildings equipped throughout with an *automatic sprinkler system* installed in accordance with 780 CMR 906.2.1 or 906.2.2, provided that automatic *sprinklers* are also installed in *attics* and other concealed roof spaces of combustion construction.

720.8 Ventilation: *Ventilation* of concealed roof spaces shall be maintained in accordance with 780 CMR 1210.0.

780 CMR 721.0 FIRERESISTIVE REQUIREMENTS FOR PLASTER

721.1 Thickness of plaster: The required thickness of fireresistance rated plaster protection shall be determined by the prescribed fire tests for the specified use group and type of construction and in accordance with the provisions of 780 CMR 2505.0 for interior plastering and 780 CMR 2506.0 for exterior plastering. The thickness in all cases shall be measured from the face of the lath where applied to gypsum lath or metal lath.

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721.2 Plaster equivalents: For fireresistive purposes, ½ inch (13 mm) of unsanded gypsum plaster shall be deemed equivalent to ¾ inch (19 mm) of one-to-three sanded gypsum or one inch (25 mm) of Portland cement sand plaster.

721.3 Noncombustible furring: In buildings of Types 1 and 2 construction, plaster shall be applied directly on masonry or on approved noncombustible plastering base and furring.

721.4 Double reinforcement: Except in solid plaster partitions, or where otherwise determined by the prescribed fire tests, plaster protection more than one inch (25 mm) in thickness shall be reinforced with an

780 CMR 722.0 THERMAL- AND SOUND-INSULATING MATERIALS

722.1 General: Insulating batts, blankets, fills or similar types of materials—other than fiberboard and foam plastic insulation—including *vapor retarders* and breather papers or other coverings which are incorporated in construction elements, shall be installed as required by 780 CMR 722.0. Fiberboard insulation shall be installed as required by 780 CMR 2309.0, and foam plastic insulation shall be installed as required by 780 CMR 2603.0.

722.2 Exposed installations: Such materials, where exposed as installed in rooms or spaces, including *attics* and crawl spaces of buildings of any type construction, shall have a flame spread rating of 25 or less and a smoke-developed rating of 450 or less when tested in accordance with ASTM E84 listed in *Appendix A*. Plenum installations shall comply with the requirements of 780 CMR 2805.0 and the mechanical code listed in *Appendix A*.

722.3 Concealed installations: Insulating materials, where concealed as installed in buildings of any type

additional layer of approved lath embedded at least ¾ inch (19 mm) from the outer surface and fixed securely in place.

721.5 Plaster alternatives for concrete: In reinforced concrete construction, gypsum or portland cement plaster is permitted to be substituted for ½ inch (13 mm) of the required poured concrete protection, except that a minimum thickness of ¾ inch (ten mm) of poured concrete shall be provided in all reinforced concrete floors and one inch (25 mm) in reinforced concrete columns in addition to the plaster finish. The concrete base shall be prepared in accordance with 780 CMR 2506.0.

of construction, shall have a flame spread rating of 75 or less and a smoke-developed rating of 450 or less when tested in accordance with ASTM E84 listed in *Appendix A*.

722.3.1 Facings: All *vapor retarders*, whether integral or applied separately, shall be installed on the warm side of the building element, and shall have a permeance not exceeding one perm. Where insulation materials are installed in concealed spaces (such as wall, floor or ceiling cavities), *attics* or crawl spaces in buildings of Types 3, 4 and 5 construction, the flame spread and smoke-developed rating limitations do not apply to facings, provided that the facing is installed behind and in substantial contact with the unexposed surface of the ceiling, floor or wall finish.

722.4 Cellulosic insulation: Cellulosic insulation shall meet the requirements of CPSC 16 CFR, Parts 1209 and 1404, listed in *Appendix A*.